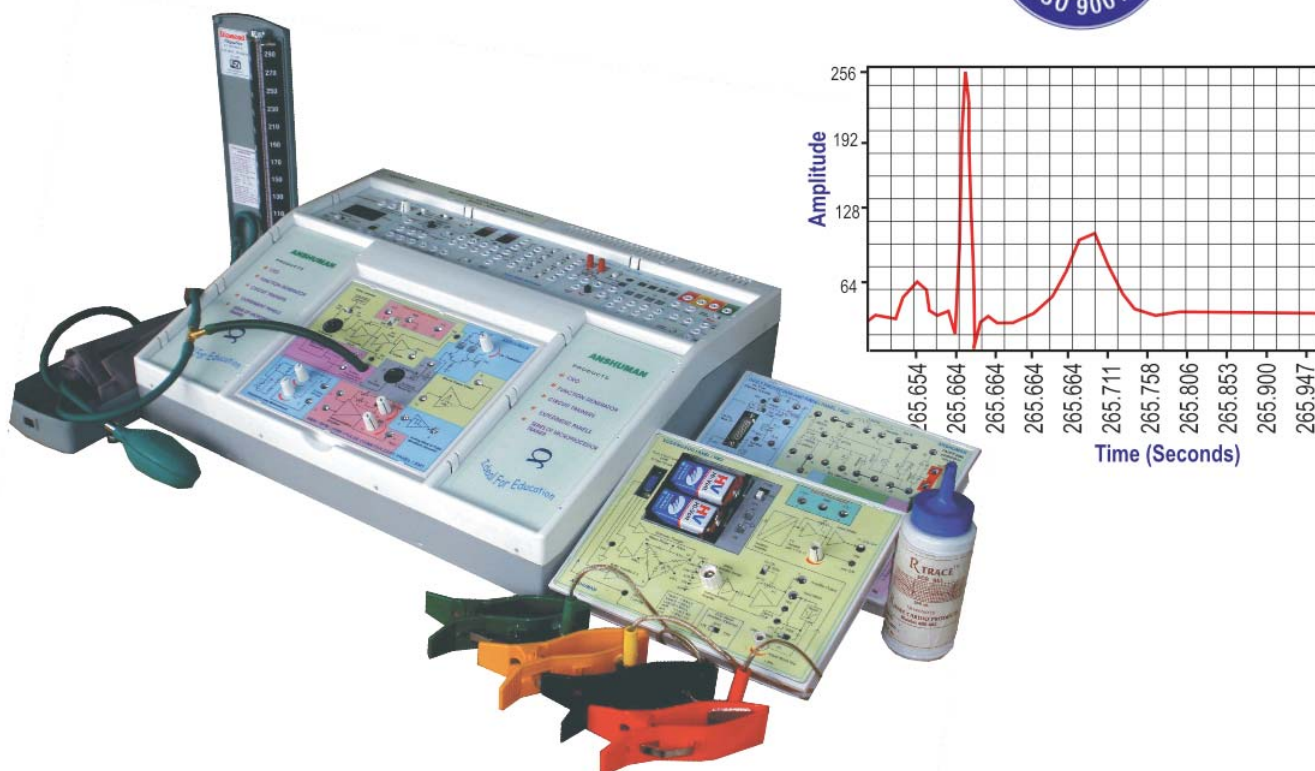


# BIO-MEDICAL INSTRUMENTATION TRAINER (Model : XPO-BOM)



- ◆ Aesthetically designed injection moulded electronic desk. Master unit carrying useful experiment resources like Power supplies, DPMs, Computer Interface, Function Generator etc. while the central slot will carry replaceable experiment panel secured in an ABS molded plastic sturdy enclosure.
- ◆ Has colorful screw less overlay showing circuit & its connection tag numbers for easy connectivity.
- ◆ Hands on learning emphasized. Set of Users Guide provided with each Unit
- ◆ Battery operated body signal measurements for safety. Please replace 9V battery cells every semester.
- ◆ PC based graph drawing facility & display to capture body signals.

## Specifications of Master Unit

Power Supply	DC Supply	+5V / 1A, $\pm 12V$ / 500mA 3 to 18V DC (Variable)/ 1A (Isolated ) -2 nos. With short ckt & overload protection. Both kept isolated to facilitate either 3 to 36V or $\pm 18V$ power supplies etc.
	AC Supply	12-0-12V AC, 150mA. Short circuit protected
Computer Interface	Digital I/O	Using switch selectable parallel port or optional USB port (Using converter supplied) 8 I/p, 8 O/P, 8 Bidirectional I/O Lines (TTL), opto isolated Adaptor to prevent damage to pc
	Analog I/P	2nos. of $\pm 9V$ ADC channels, 2nos. of 0-2.5V ADC channels, Max BW-1KHz
	Analog O/P	O/P 0-10V max(optionally 0-2.5V), max. load 10 mA
USB I/O Module	(optional)	USB converter using PIC microcontroller enclosed in 25 Pin D shell with Type A to mini B cable
Frequency Counter	(optional)	4 digit frequency display, Max I/p - 10Vpp, 300mV sensitivity, Range : 2MHz. Max.
MIC Pre- Amplifier		Pre-amplifier function block with DC gain = 1, AC gain = 50 .
L/S Amplifier & speaker	(optional)	Amplifier gain 20, with volume control driving 8ohm, 0.5W L/S , Mounted on hind Plate
Function Generator	Waveform	Sine, Triangle & Square wave output for TTL/CMOS with variable pot
	Frequency	1 Hz to 1MHz in 6 ranges, with amplitude & frequency control pots.
	Voltage & Current	15V p-p max. (Sin / TRG) open ckt. (7.5Vpp into 50 ohm termination)

<b>Miscellaneous Function Blocks</b>	Logic input switches & status Indicators, Pulser Switches (2 Nos.), Logic Probe, 7 segment display, Onboard POTS, 3-Phase voltage Generator, Onboard DPM (1no.).
<b>Accessories</b>	1) Parallel Port 25pin Cable 2) Dynamic Mic or electret Mic with built in bias (cell) (optional)
<b>Operating Voltage</b>	220/240Vac Switch settable $\pm 10\%$ , 50Hz/80 VA
<b>Mechanical Dimensions</b>	(A) Master Unit : 460mm(W), 160mm(H), 350mm(D), Net weight : 7.5 Kg. Gross Wt. : 9.51 Kg. (B) Panel : 215mm(W), 165mm(H), 40mm(D), Net Weight = 700 gm. approx. (C) Patch Cords: 4mm male to male patchcords 16 Nos. [2 - 120 mm length, 14 - 500 mm length]

**Modular experiment panels** - Select one or more to work

### 1) RRM /BPM / HRM / Pulse Oximeter Expt. Panel (BM1)

(Provided with 16 banana & 2 test points)

#### • Function Blocks used:

LED driver @ 350Hz, RED & IR LED, I to V converter circuit, Sample & hold circuit, Blood Pressure Sensor (300 mm Hg) mounted inside panel, Shares MIC with pre-amplifier and loudspeaker with Audio amplifier from Master Unit, Band pass filters (11Hz & 1.6 Hz) Analog wave to square wave converter, Wheastone Bridge, Instrumentation amplifier circuit (Gain= x 50 & x 1), Skin Contact Measurement go/no go circuit, AC Amplifier (X20 gain)

#### • Detachable Sensor Modules / Electrodes :

- Pulse oximeter probe / Module
- Lie detector with CAL & temperature sensor,
- Sphygmomanometer / blood pressure apparatus,
- Electronic stethoscope probe / Module using Electret MIC

#### • Experiments covered:

- Pulse oximeter / Plythysmogram (HRM)
- Respiration rate measurement (RRM).
- Lie Detector based on skin impedance change.
- Blood Pressure Measurement (BPM) using Korotkoff 's Method
- Blood Pressure Measurement (BPM) using Oscillometry method
- Heart Rate Measurement (HRM) by using Electronic stethoscope
- Study of Bandpass (11 Hz) filter to plot frequency waveform for HRM
- Study of Bandpass (1.6 Hz) filter to plot frequency waveform for Oscillometry method

### 2) ECG / EMG Study Experiment Panel (BM2)

(Provided with 9 banana & 2 test points)

#### • Function Blocks used:

Buffered 3 lead einthoven triangle creating 6 measurement combinations using 2 pole 6 way Rotary Switch, Instrumentation amplifier (Gain = 10 / 100), NIV amplifier (Gain = 10 to 100), 1 no. of isolation amplifier, Span zero amplifier.

(Gain = 2 to 20), Notch filter (50Hz), HPF or DC blocker, LPF or High pass noise suppressor, Battery operated body signal measurement for safety, ECG signal simulator.

#### • Detachable Sensor Modules / Electrodes :

Supplied with Limb Electrodes (4no's), Disposable Electrodes (Ag/Agcl -10Nos)

#### • Experiments covered :

- Plotting & measurement of ECG, EMG, EOG waveform
- Study of band reject (50 Hz notch) filter.
- Working with simulated ECG signals.
- Optionally EEG Measurements.

### 3) RRM, BIA Experiment Panel/BM3 (Provided with 12

banana & 4 test points)

#### • Function Blocks used:

R & C component BI simulator, 50KHz wein bridge oscillator, 90° phase shifter, Buffered Excitation current source (800uA), instrumentation Amplifier(X10), Resistive component synchronous detector(IPS), Capacitive component synchronous detector (QPS), peak detector, AC amplifier (X10), Zero crossing detector, Isolation amplifier, Span zero amplifier (Gain = 2 to 20), Battery operated body signal measurement for safety.

#### • Detachable Sensor Modules / Electrodes :

Supplied with Limb Electrode (4no's), Chest Electrodes (2 Nos)

#### • Experiments covered:

- Measure Body impedance using Body impedance Analyzer (BIA) and compare with standard
- Measurement of Respiration Rate using BIA

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Specifications subject to change without notice